Background on Aquifer Exemption

Briefing for Congressman Markey's Staff

June 2012

Briefing Outline

Key Principles of the Safe Drinking Water Act (SDWA) and the Underground Injection Control (UIC) Program

- Underground Sources of Drinking Water (USDW)
- Well Classification
- UIC Program Primacy

Background on Aquifer Exemptions

- Procedure for exemptions
- Substantial versus non-substantial revision
- Basis for exemption
- Deciding about drinking water sources
- Scope of the issue
- Aquifer Exemptions and In Situ Leaching Uranium Mining

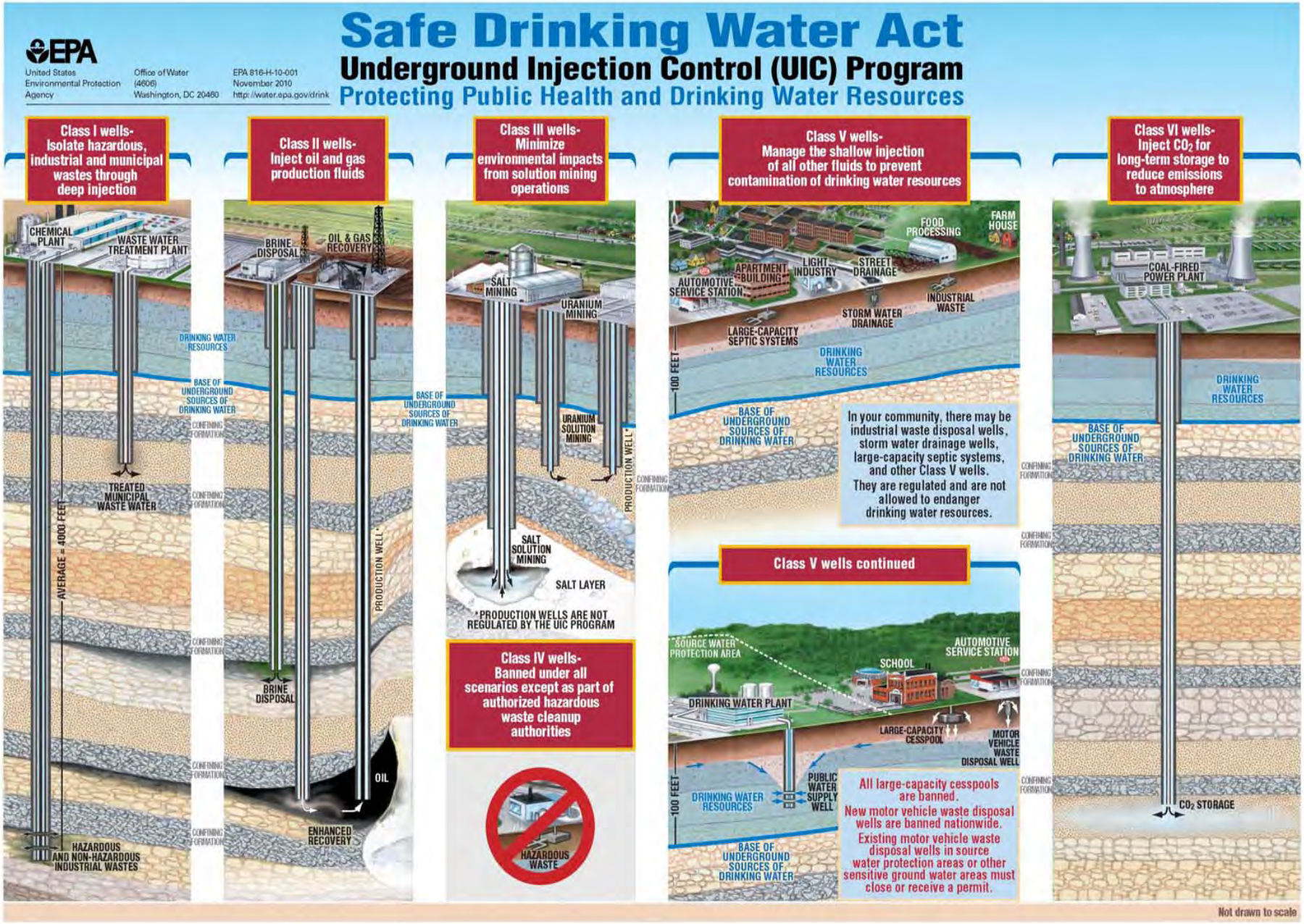
Underground Sources of Drinking Water

SDWA is designed to prevent endangerment of underground drinking water sources (SDWA 1421(b))

Definition (40 CFR 144.3)

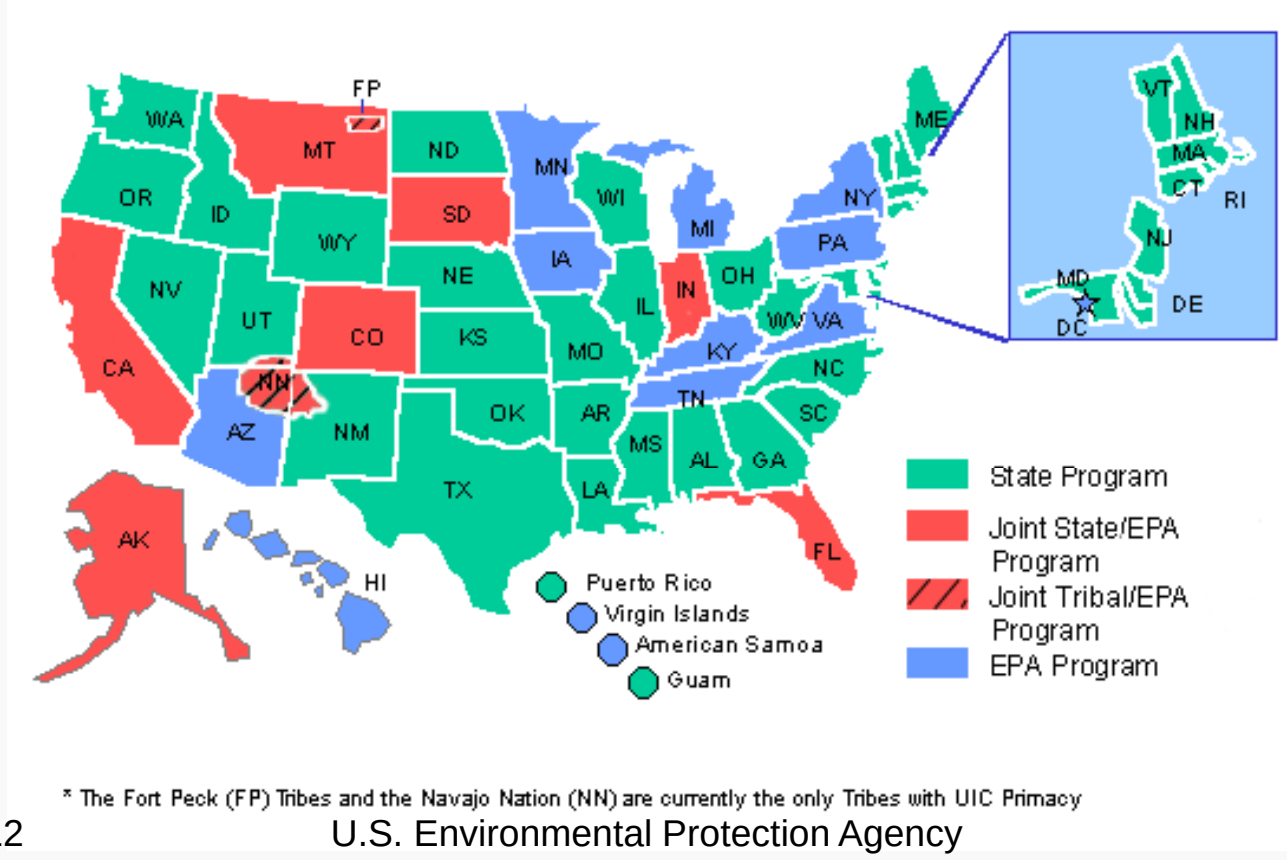
- *Underground source of drinking water (USDW)* means an aquifer or its portion:

  (a)(1) Which supplies any public water system; or
  (2) Which contains a sufficient quantity of ground water to supply a public water system; and
  (i) Currently supplies drinking water for human consumption; or
  (ii) Contains fewer than 10,000 mg/l total dissolved solids; and
  (b) Which is not an exempted aquifer.


EPA
United States Environmental Protection Agency
Office of Water (4606) Washington, DC 20460
EPA 816-H-10-001 November 2010 http://water.epa.gov/drink
Safe Drinking Water Act
Underground Injection Control (UIC) Program
Protecting Public Health and Drinking Water Resources
Class I wells- Isolate hazardous, industrial and municipal wastes through deep injection
Class II wells- Inject oil and gas production fluids
Class III wells- Minimize environmental impacts from solution mining operations
Class V wells- Manage the shallow injection of all other fluids to prevent contamination of drinking water resources
Class VI wells- Inject CO_2 for long-term storage to reduce emissions to atmosphere
CHEMICAL PLANT
WASTE WATER TREATMENT PLANT
DRINKING WATER RESOURCES
BASE OF UNDERGROUND SOURCES OF DRINKING WATER
CONFINING FORMATION
TREATED MUNICIPAL WASTE WATER
AVERAGE = 4000 FEET
HAZARDOUS AND NON-HAZARDOUS INDUSTRIAL WASTES
BRINE DISPOSAL
OIL & GAS RECOVERY
PRODUCTION WELL
OIL
ENHANCED RECOVERY
SALT MINING
URANIUM MINING
URANIUM SOLUTION MINING
SALT SOLUTION MINING
SALT LAYER
*PRODUCTION WELLS ARE NOT REGULATED BY THE UIC PROGRAM
Class IV wells- Banned under all scenarios except as part of authorized hazardous waste cleanup authorities
HAZARDOUS WASTE
FOOD PROCESSING
FARM HOUSE
APARTMENT BUILDING
LIGHT INDUSTRY
STREET DRAINAGE
AUTOMOTIVE SERVICE STATION
INDUSTRIAL WASTE
STORM WATER DRAINAGE
LARGE-CAPACITY SEPTIC SYSTEMS
100 FEET
In your community, there may be industrial waste disposal wells, storm water drainage wells, large-capacity septic systems, and other Class V wells. They are regulated and are not allowed to endanger drinking water resources.
Class V wells continued
SOURCE WATER PROTECTION AREA
SCHOOL
DRINKING WATER PLANT
LARGE-CAPACITY CESSPOOL
MOTOR VEHICLE WASTE DISPOSAL WELL
PUBLIC WATER SUPPLY WELL
All large-capacity cesspools are banned.
New motor vehicle waste disposal wells are banned nationwide.
Existing motor vehicle waste disposal wells in source water protection areas or other sensitive ground water areas must close or receive a permit.
COAL-FIRED POWER PLANT
CO_2 STORAGE
Not drawn to scale

UIC Program Background *Primacy*

- 33 States have primary enforcement authority (primacy) for the UIC program; EPA and States share program implementation in 7 States; EPA directly implements the entire UIC Program in 10 states



* The Fort Peck (FP) Tribes and the Navajo Nation (NN) are currently the only Tribes with UIC Primacy

Background on Aquifer Exemptions

- All USDWs are required to be protected by the UIC program
- The UIC program regulations allow the state, with EPA approval, to exempt aquifers or portions of aquifers from protection under the Safe Drinking Water Act (SDWA)
- The presumption is that the exempted aquifer will never be used as a drinking water source
- The designation of an aquifer exemption is a final EPA action
- All supporting documentation placed in Administrative Record

Background on AE: Procedure for Exemptions

- EPA Administrator or Regional Administrators have authority to approve exemptions (40 CFR 144.7(b)(2)) depending upon whether they are Substantial or Non-substantial program revision
- Substantial program revisions are approved by the EPA Administrator while non-substantial ones are approved by EPA Regional Administrators
- Exemptions subject to public input
- Information required from owners or operators in permit application for Class II and III in 40 CFR 144.7(c)

Background on AE: Basis for Exemption

Criteria for exemptions in 40 CFR 146.4

- An aquifer or a portion thereof which meets the criteria for an "underground source of drinking water" in § 146.3 may be determined under § 144.7 of this chapter to be an "exempted aquifer" for Class I-V wells if it meets the criteria in paragraphs (a) through (c) of this section. Class VI wells must meet the criteria under paragraph (d) of this section:

(a) It does not currently serve as a source of drinking water; **and**

(b) ***It cannot now and will not in the future serve as a source of drinking water*** because:

(1) It is mineral, hydrocarbon or geothermal energy producing, or can be demonstrated by a permit applicant as part of a permit application for a Class II or III operation to contain minerals or hydrocarbons that considering their quantity and location are expected to be commercially producible.

(2) It is situated at a depth or location which makes recovery of water for drinking water purposes economically or technologically impractical;

(3) It is so contaminated that it would be economically or technologically impractical to render that water fit for human consumption; or

(4) It is located over a Class III well mining area subject to subsidence or catastrophic collapse; **or**

(c) ***The total dissolved solids content of the ground water is more than 3,000 and less than 10,000 mg/l and it is not reasonably expected to supply a public water system***

(d) ***The areal extent of an aquifer exemption for a Class II enhanced oil recovery or enhanced gas recovery well may be expanded for the exclusive purpose of Class VI injection for geologic sequestration under § 144.7(d) of this chapter*** if it meets the following criteria:

(1) It does not currently serve as a source of drinking water; and

(2) The total dissolved solids content of the ground water is more than 3,000 mg/l and less than 10,000 mg/l; and

(3) It is not reasonably expected to supply a public water system.

Background on AE: Deciding about Drinking Water Sources

- How do I decide if the aquifer does not now serve as a source of drinking water?
  - Drinking water wells in the vicinity
  - Time of travel
  - Ground water modeling

- How do I decide if the aquifer will not in the future serve as a drinking water source?
  - Mineral or hydrocarbon resource?
  - Depth and location compared to technology and economics?
  - Contamination?
  - Subsidence or collapse likely from Class III UIC mining?

- EPA developed Guidance 34 (January 9, 1984) to addresses UIC program revisions, either in response to primacy applications or aquifer exemptions that require a program revision

- Guidance 34 supplements the rule criteria at 146.4 by discussing specific considerations associated with the criteria and describing the steps to be taken in evaluating an aquifer exemption application (Attachment 3 of Guidance 34)

Aquifer Exemptions – Scope of Issue

- EPA is seeing more of the aquifer exemption requests with the rise in energy extraction activities
- These aquifer exemption requests are raising a number of public health and policy issues
- Almost all AEs are requested for injection associated with uranium mining, oil and gas production, or other mineral producing needs
- There are approximately 1400 aquifer exemptions nationwide
  - ~ 93% related to Class II disposal wells associated with oil and gas production
  - ~ 3% related to Class I Industrial and Municipal Waste Disposal Wells
  - ~ 4% related to Class III In Situ Leaching Uranium Mining wells

Proposed Uranium Energy Corp (UEC) Mining Site Near Goliad, Texas

Issues

- TCEQ permitted the Goliad Site in December 2010 and submitted a request for aquifer exemption to EPA on May 2011
- The application submitted by TCEQ revealed a significant number of water wells within the area surrounding the proposed exemption
- The number and proximity of water source wells in this application is unique compared to previously processed aquifer exemptions applications, which have historically been in remote rural settings.

Action Taken

- EPA sent a letter to TCEQ requesting additional modeling data to demonstrate that the drinking water wells in closed proximity of the proposed exempted aquifer do not use water from the proposed exempted aquifer

Current Status

- TCEQ responded to EPA's request for additional information, requesting that EPA approves the request without additional modeling
- EPA plans to meet with TCEQ to discuss the request

Proposed Hydro Resources Inc (HRI) Uranium Mining Project in Church Rock, NN

Issue

- Navajo Nation Requested Consultation on HRI Inc. Proposal for Uranium Project in New Mexico And Adjacent to or on Navajo Lands
- While HRI Inc. has sought to begin mining since 1988 on the same plot of leasehold in New Mexico, the company seeks to renew a New Mexico UIC permit to begin mining and use a 1988 EPA approved Aquifer Exemption as the basis for moving the project forward
- EPA has an inherent right to change any decision made if circumstances change
- The UIC Regulations at Section 145.32, Procedures for revision of State Programs, permits the Administrator to request additional materials from a State Primacy program if circumstances have changed

Action Taken

- EPA met with the Navajo Nation to discuss HRI's proposal.

Current Status

- EPA communicated during a recent consultation with the Navajo Nation that the original AE will be re-evaluated to determine whether the original exemption applies

Proposed Uranium One's Aquifer Exemption Request (Willow Creek Project), WY

Issue

- In November 2010, Wyoming notified EPA of Class I permit renewals and requested aquifer exemptions for recently-discovered USDWs underlying the injection zone of two Class I injection wells (Willow Creek Project)
- Wyoming proposes to exempt portions of USDWs – from 7,000' deep to 17,500' deep – in two locations beneath two permitted Class I injection well sites at a uranium in situ leaching site called Christensen Ranch
- The exemptions would be for the portions of the USDWs within a ¼ mile radius from the Class I well sites
- WY is requesting an aquifer exemption for a USDW that will not be used as the injection zone which is not typical practice in the UIC Program

Action Taken

- EPA determined based on previous site-specific information that WY AE request constitute a substantial program revision to the WYDEQ 1422 UIC Program because the formations contain USDW of less than 3,000 TDS

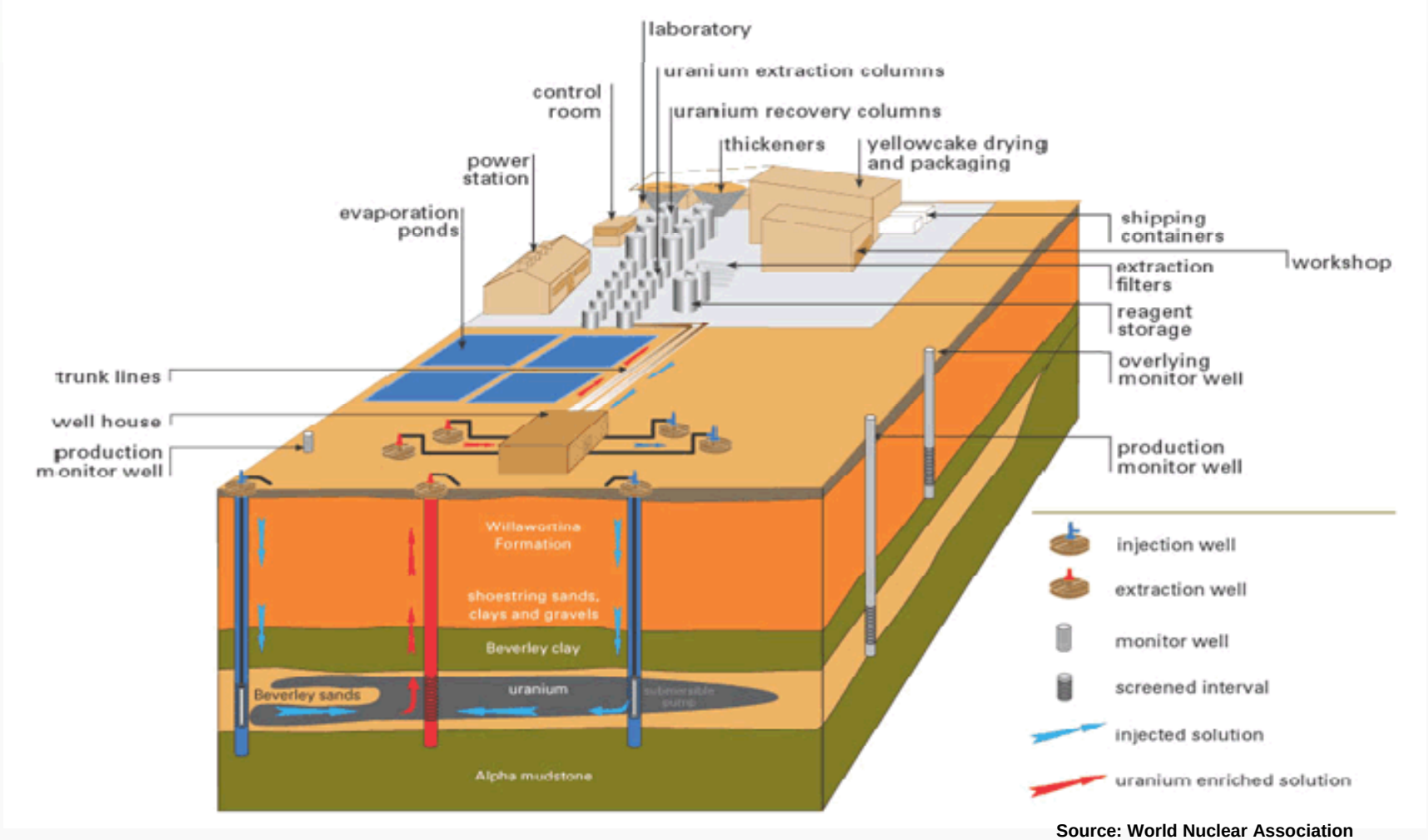
Current Status

- EPA is in the process of finalizing a Federal Register Notice for this action that would seek comments on whether to approve or disapprove the aquifer exemption request

In Situ Leaching Uranium Mining

- In situ leaching (ISL), also known as solution mining, or in situ recovery (ISR), involves leaving the ore where it is in the ground, and recovering the minerals from it by dissolving them and pumping the pregnant solution to the surface where the minerals can be recovered
- Uranium ISL uses the native groundwater in the orebody and Uranium is extracted by pumping Lixivian (a complexing agent - an oxidant) via a series of injection wells through the underground orebody to recover the minerals in it
- Lixivian slowly migrates through the aquifer leaching the uranium bearing host sand on its way to strategically placed extraction wells where submersible pumps pump the liquid to the surface for processing
- Once the pregnant solution is returned to the surface, the uranium is recovered

ISL Process



Source: World Nuclear Association

Licensing and Permitting for Uranium ISL Facility

- NRC has statutory authority through the Atomic Energy Act and UMTRCA to regulate uranium ISL facilities
- In addition to obtaining an NRC license, uranium ISL facilities also must obtain the necessary permits from the appropriate federal, tribal, and state agencies
- Under different environmental laws such as the Clean Water Act, the Safe Drinking Water Act, and the Clean Air Act, EPA has statutory authority to regulate activities that may affect the environment.
- EPA permitting that is most relevant for uranium ISL facilities is related to underground injection of the leaching solution (i.e., the lixiviant) and liquid effluents, surface discharge of treated waters and industrial and construction stormwaters, and air quality

UIC Permitting at ISL Sites

- Aquifer Exemption
- Industrial and Municipal Waste Disposal Wells (UIC Class I)
- Mining Wells (UIC Class III)

UIC Permitting at ISL Sites

Aquifer Exemption

- UIC criteria for exemption of an aquifer that might otherwise be defined as USDW are found at 146.4

- These criteria include whether the aquifer is currently a source of drinking water and whether the water quality is such that it would be economically or technologically impractical to use the water to supply a public water system

UIC Permitting at ISL Sites

Industrial and Municipal Waste Disposal Wells (UIC Class I)

- This permit class governs deep disposal of industrial, commercial, or municipal waste below the deepest usable aquifer
- This type of injection uses wells and requires applied pressure
- It includes all wells that dispose of waste on a commercial basis, even if the waste would be otherwise eligible for disposal into a Class II well
- For Uranium ISL facilities this type of UIC permit is necessary to use deep well injection for waste disposal

UIC Permitting at ISL Sites

Mining Wells (UIC Class III)

- These permits govern injection wells drilled to recover minerals
- They include experimental technology wells, underground coal gasification wells, and wells for the in-situ recovery of materials such as copper, uranium, and trona
- For uranium ISL facilities, this type of UIC permit covers wells that inject lixiviant into the uranium mineralization

Questions